# 2.8
# Complex Zeros &
# The Fundamental Theorem of Algebra

Name _____ Date _____ Period _____

**Write the polynomial in standard form, and identify the zeros of the function and the x-intercepts of its graph. Show work!**

1. $f(x)=(x-3i)(x+3i)$

2. $f(x)=(x-1)(x-1)(x+2i)(x-2i)$

**Write a polynomial function of minimum degree in <u>factored form</u> with real coefficients whose zeros include those listed, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the x-intercepts</u>. Show work!**

3. $1-2i$ *and* $1+2i$

4. $2, 3,$ *and* $i$

5. $-2,$ *and* $1+2i$

6. $\sqrt{3}, -\sqrt{3}\ -4,$ *and* $5-6i$

**Write a polynomial function of minimum degree in <u>standard form</u> with real coefficients whose zeros include those listed, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the x-intercepts</u>. Show work!**

7. $x = 2, 3i \; and \; i$

8. $x = 0 \; and \; 2 - 5i$

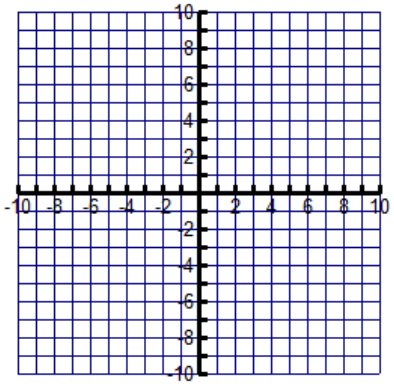
**Write a polynomial function of minimum degree in <u>factored form</u> with real coefficients using the following information, <u>find the degree of the polynomial (# of zeros)</u> and <u>identify the x-intercepts</u>. Show work!**

9. $1(multiplicity\ 2), -2(multiplicity\ 3)$

10. $2(multiplicity\ 2), 3+i\ (multiplicity\ 1)$

**Write a polynomial function of minimum degree in <u>standard form</u> with real coefficients whose zeros and their multiplicities include those listed. Find the <u>degree of the polynomial</u>, the <u>*x*-intercepts</u> and <u>sketch the graph.</u> Show work!**

11. $leading\ coefficient - 1$
$x = 0\ (multiplicity\ of\ 2),$
$x = 3\ (multiplicity\ of\ 2)$



**Match the polynomial function graph to the given zeros and multiplicities.**

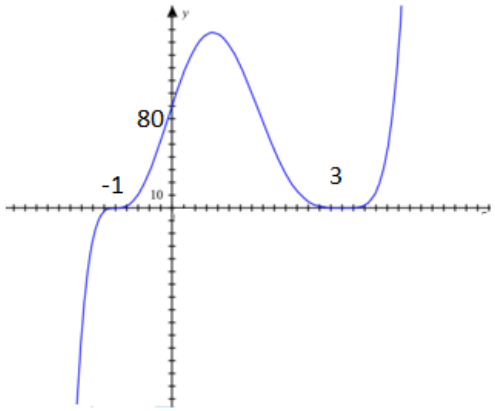
12. $-3\,(multiplicity\ 2), 2\,(multiplicity\ 3)$

13. $-3\,(multiplicity\ 3), 2\,(multiplicity\ 2)$

14. $-1\,(multiplicity\ 4), 3\,(multiplicity\ 3)$

15. $-1\,(multiplicity\ 3), 3\,(multiplicity\ 4)$

a)

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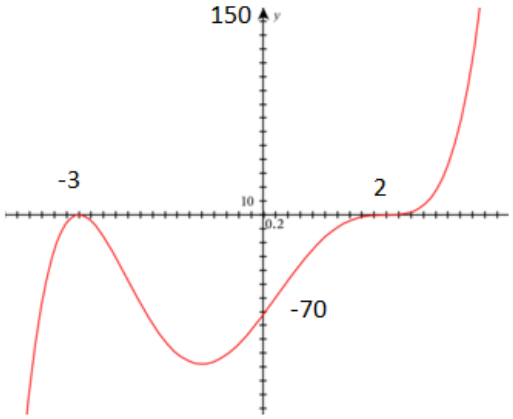
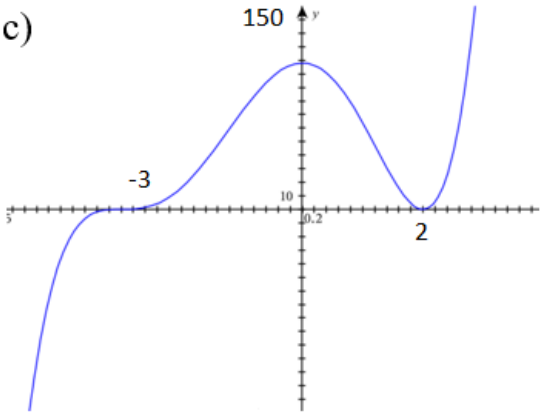



c)

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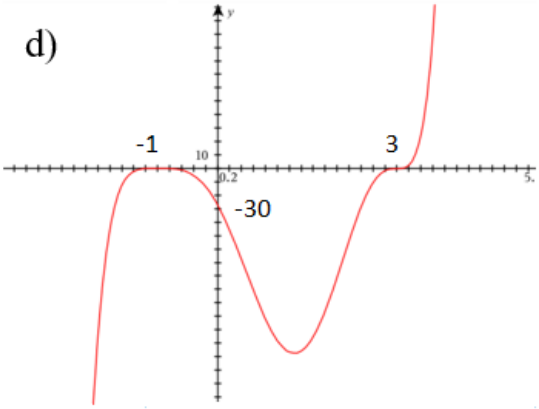


**Find all complex zeros of each polynomial. Write the function in factored form. Show work!**

16. $f(x) = x^3 + 4x - 5$

17. $f(x) = 3x^4 + 8x^3 + 6x^2 + 3x - 2$

**Using the given zero, find all the remaining zeros of each polynomial. Write the function in factored form. Show work!**

18. $1+i$ is a zero of $f(x)=x^4-2x^3-x^2+6x-6$

19. $4i$ is a zero of $f(x)=x^4+13x^2-48$

**Write the function as a product of linear and irreducible quadratic factors all with <u>real coefficients (don't go to complex numbers</u>. Show work!**

20. $f(x)=2x^3-x^2+2x-3$

21. $f(x)=x^4-2x^3+x^2-8x-12$

22. Is it possible to find a polynomial of degree 3 with real number coefficients that has -2 as its only real zero? Explain.

23. Is it possible to find a polynomial of degree 3 with real coefficients that has $2i$ as its only nonreal zero? Explain.

**Bonus: Do on separate sheet of paper.**

**Find the unique polynomial with real coefficients that meets these conditions.**

**30. Degree 4; zeros at $x = 1 - 2i$ and $x = 1 + i$ ; $f(0) = 20$**